



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,695	11/30/2001	Otto Z. Zhou	032566-018	1828

7590 02/17/2005

Ronald L. Grudziecki
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER

MAYEKAR, KISHOR

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 02/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/996,695

Applicant(s)

ZHOU ET AL.

Examiner

Kishor Mayekar

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6, 8-29 and 66-74 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 8-29 and 66-74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 20 December 2004 has been entered.

Response to Amendment

2. The declaration filed on 20 December 2004 under 37 CFR 1.131 is sufficient to overcome over the art rejections in the last Office action based on the references of TAKAI (U.S. Patent Application Publication No. 2003/0044519 A1) and AFFOUNE et al. ("Electrophoretic Deposition of Nanosized Diamond Particles", Langmuir 2001, 17, 547-551).

Claim Objections

3. Claim 13 is objected to because of the missing "period" at the end of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-4, 6, 12, 14-25, 27-29, 66-71, 73 and 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over RUSS et al. (6,342,755). RUSS' invention is directed to a process for manufacturing a field emission cathode by an electrophoretic deposition. RUSS discloses that the deposition comprises providing a particle loaded deposition bath comprising a plurality of particles of an electron emitting material, a plurality of particles of an insulating material, a hydrophilic alcohol, water and a charger (see abstract), wherein the emitting particles include elemental metals, silicon and forms of carbon and are of particle size between 0.05 to 20 μm (col. 2, lines 15-23); wherein the insulating particles include oxides and carbides and are of particle size of a quarter or a half of that of the emitting particles (col. 2, lines 24-30); and wherein the charger includes

Mg(NO₃)₂ (col. 2, lines 47-49). The difference between RUSS and the above claims is the use of carbon nanotubes or nanowires as the nanostructure-containing material. Since RUSS' particles are particles of nanostructure-containing materials and include forms of carbon and oxide, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified RUSS' teachings because the selection of any of known equivalent forms of carbon, silicon or oxide as particles in RUSS would have been within the level of ordinary skill in the art.

As to the subject matter of claims 15-17 and 19-22, RUSS discloses the concentration of a charger, the concentration of particles in the suspension, the electrophoresis conditions and the annealing (col. 5, line 1 through col. 6, line 17 and examples), the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the RUSS teachings because it has been settled that proper adjustment of a known effective variable of a known or obvious process is within the capabilities of one having ordinary skill in the art. *In re Aller* 105 USPQ 233; *In re Boesch* 205 USPQ 215.

As to the subject matter of claim 23, it would have been obvious matter of design choice as RUSS discloses the step of drying in air and baking the deposit and this would appear perform equally well to convert the deposit.

As to the subject matter of claims 66-71 and 73, RUSS discloses in Fig. 1a, the use of a patterned substrate.

As to the subject matter of claims 28 and 29, since RUSS' conductive layer being a chromium layer (col. 3, line 66 through col. 4, line 2), the provision of an adhesion promoting layer is there in RUSS.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over RUSS '755 as applied to claims 1-4, 6, 12, 14-25, 27-29, 66-71, 73 and 74 above, and further in view of CHOI et al. (6,616,497) or GAL-OR et al. (6,258,237). RUSS as applied above discloses in col. 5, lines 62-64 that particles may be may be ball milled with glass beads to break up any agglomerates prior to being added to the deposition bath. The difference between RUISS and the instant claim is RUSS is silent in regards to the stirring the deposition bath to thereby facilitating the formation of a stable suspension. CHOI shows in a process for manufacturing a field emitter by electrophoretic deposition the agitating during the

electrophoresis (col. 2, lines 44-49). GAL-OR, a reference cited in a previous Office action, shows in an electrophoretic depositing the agitating during the electrophoresis (col. 11, lines 6-8). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified RUSS' teachings as suggested by either CHOI or GAL-OR because this would result in uniformly suspending the particles during the electrophoresis.

7. Claims 26 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over RUSS '755 as applied to claims 1-4, 6, 12, 14-25, 27-29, 66-71, 73 and 74 above, and further in view of DE JAEGER et al. (5,296,117), another reference cited in the previous Office action. RUSS as applied above discloses in col.5, lines 25-38 the use of a dispersant include carboxy methyl cellulose to increase adhesion strength. The difference between RUSS and the instant claims is the use of a specific binder. DE JAEGER shows in a process of electrophoretically depositing particle the use of binder in addition to a charger (paragraph crossing cols. 10 and 11). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified RUSS' teachings as suggested by DE JAEGER because this result in fixing the

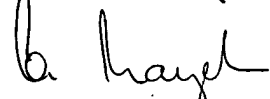
particles and the selection of any of known equivalent organic resin binder would have been within the level of ordinary skill in the art.

8. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over RUSS '755 as applied to claims 1-4, 6, 12, 14-25, 27-29, 66-71, 73 and 74 above, and further in view of COLBERT et al. (6,824,755). The difference between RUSS and the instant claims is the use of the type of carbon nanotube. COLBERT discloses that carbon nanotubes are known to produce by arc discharge (col. 15, line 53 through col. 16, line 23) and the step of cutting and annealing the nanotubes (col. 18, lines 14-51). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified RUSS' teachings as shown by COLBERT because the selection of any known equivalent nanotubes for RUSS' nanostructure-containing materials would have been within the level of ordinary skill in the art.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kishor Mayekar whose telephone number is (571) 272-1339. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kishor Mayekar
Primary Examiner
Art Unit 1753